INTRODUCTION

History of Los Angeles County FIMR Project

The Los Angeles County Department of Health Services, Family Health Programs received a Federal Title V block grant in 1992 to develop a Fetal-Infant Mortality Review (FIMR) Project, one of thirteen such projects funded through the California Department of Health Services, Maternal and Child Health Branch.

A multidisciplinary Technical Review Panel (TRP) reviewed selected cases of fetal and neonatal deaths for the first three years, in order to identify possible gaps in services which may be amenable to community or government action. The Technical Review Panel consists of 15 professionals in the fields of obstetrics, midwifery, nursing, neonatology, pediatrics, bioethics, social work and public health. (see Appendix 1 for TRP membership)

Staffing for the FIMR Project consists of a project director, who provides overall supervision and administration, a public health nurse, who abstracts vital records, medical records and autopsy reports, and a secretary, who provides office support.

Review of maternal deaths began in 1996 at the urging of the California Department of Health Services Maternal and Child Health Branch and the Centers for Disease Control and Prevention. The FIMR Technical Review Panel reviewed all sixty-three identified maternal deaths in Los Angeles County from the years 1994-1996 in order to examine causes and contributing factors and to seek solutions to any gaps in services or unmet needs which contributed to maternal deaths.

The Community Advisory Group (CAG) has further refined and disseminated recommendations of the Technical Review Panel. In addition to a broad range of professionals on the TRP, members of the CAG represent the fields of education, religion, family planning and come from community-based organizations concerned with perinatal health. (see Appendix 2 for CAG membership)

One recommendation of the CAG was to develop a mechanism for collaborative planning and implementation of public and personal health strategies. From this recommendation and the support of the partners within the CAG, the Los Angeles County Perinatal Health Care Consortium was formed in 1997. The consortium brings together representatives of managed care plans, LA County Public Health Programs and Services, Medi-Cal linked programs and community based organizations concerned with perinatal health. The Perinatal Health Consortium has held several forums to address the public health issues of perinatal care for low-income and often high-risk pregnant women.

Three working groups were formed to develop plans for dealing with high-priority issues identified by the consortium:

- Adverse Perinatal Outcomes of African Americans
- Perinatal Substance Abuse
- In-Utero Transport (Developing a system to ensure delivery in transport to hospitals with the appropriate level of care for mothers and neonates)

Purpose of the Maternal Mortality Review

The purpose of this review is to better understand the scope and nature of the problems of pregnancy-related mortality in Los Angeles County. Reduction of maternal mortality remains an important public health objective. Maternal mortality has been greatly reduced in this century and has become a rare occurrence. However, advances in maternal mortality have slowed or reversed in recent years. The review of maternal mortality is a difficult process. Since maternal mortality is a rare event, it is necessary to utilize a densely populated geographic area in order to find sufficient numbers of cases for patterns to be established. Los Angeles County has a population of over 9 million people and is a suitable site for such a review. In 1915 maternal mortality in Los Angeles was 710 deaths per 100,000 live births (5). The average Los Angeles County maternal mortality for 1994-1996 was 12 deaths per 100,000 live births. The MMR for the US was 8.3 for 1994, 7.1 for 1995, and 7.6 for 1996 (2, 9).

The maternal mortality ratio for black women (30.9 per 100,000 live births) was nearly five times greater than for white women (6.7 per 100,000 live births) during 1994-1996. Healthy People 2000 has objectives of no more than 3.3 maternal deaths per 100,000 live births overall and no more than 5.0 per 100,000 to black women (4). These objectives have obviously not yet been achieved.

A second purpose of the review is to examine the process of reporting pregnancy-related deaths. Several studies have shown that maternal mortality is substantially underestimated in the United States (6,7).

Each maternal death must be considered a sentinel event. For every woman in Los Angeles County who died of pregnancy-related causes, many more had serious complications of pregnancy and many were hospitalized for conditions related to pregnancy. Improvements in perinatal systems to reduce maternal mortality will have the additional effect of reducing pregnancy-related morbidity and hospitalization.

METHODS

Definition of Pregnancy-Related Mortality

The FIMR Project used the Centers for Disease Control definition of pregnancy-related mortality (6). For purposes of this review, a death was considered pregnancy-related if it occurred during pregnancy or within one year of pregnancy termination and resulted from:

1) complication of pregnancy itself,
2) a chain of events initiated by pregnancy, or
3) aggravation of an unrelated event by the physiologic effects of pregnancy.

The California Department of Health Services defines maternal death as a death due to pregnancy, childbirth and the puerperium as identified by the International Classification of Diseases, Ninth Revision (ICD-9) codes 630-676.

Case Identification

An accurate maternal death identification system is necessary to evaluate progress in reducing pregnancy-related mortality. Systemic change can occur through case review. Recent studies show that the actual number of pregnancy-related deaths is significantly higher than the number reported in vital statistics (6,7).

For our review, maternal deaths were identified by Los Angeles County Vital Records staff as the death certificates were processed by the Registrar. Death certificates that mentioned pregnancy or conditions or procedures related to pregnancy were selected for review. Additional cases were identified by the data received for California Vital Records (1). The Vital Records list of deaths uses the ICD-9 coding of causes of deaths.

Table B

	1994	1995	1996	94-96
LA Maternal Deaths	25	26	12	63
LA Live Births	180,394	174,862	168,973	524,229
LA MMR	13.9	14.9	7.1	12.02
CA Maternal Deaths	55	47	30	132
CA Live Births	567,034	551,226	536,628	1,654,888
CA MMR	9.7	8.5	5.6	7.9
U.S. MMR	8.3	7.1	7.6	7.7

For 1996, the project identified 12 maternal deaths. The Los Angeles County Automated Vital Statistics System listed only 5 maternal deaths, using local ICD-9 coding of cause of death. The California Department of Health Services reported 8 maternal deaths in Los Angeles County for 1996. The FIMR Project used two additional methods to identify 1996 cases. Vital Records staff sent death certificates to the project if they mentioned pregnancy or conditions or procedures associated with pregnancy. This method identified a total of 12 cases, but they included four deaths that were not causally related to the pregnancy. Additionally, two student professional workers, using a list of key words related to pregnancy, individually examined 55,579 death certificates to find maternal deaths. They identified three pregnancy-related deaths that no other method had found. ICD-9 codes were not consistent between the California and Los Angeles county DHS systems.

There are several opportunities to miss information about maternal deaths:

- Medical records can be misleading.
- The cause of death written on the death certificate does not always clearly indicate that a death was related to pregnancy.
- Errors in the coding process can obliterate the link to pregnancy.

An example of a coding difference is the case of a woman who died of obstetric hemorrhage with disseminated intravascular coagulopathy due to placental abruption due to cocaine ingestion. The state coded this case as a maternal death, ICD-9 code 641, antepartum hemorrhage, but the local AVSS system did not list it as a maternal death because it was coded 855.2, accidental poisoning by local anesthetic, i.e., cocaine. Sometimes, both the county and the state counted a death as maternal but with very different codes. A woman who died from a pulmonary embolism due to deep vein thrombosis was coded locally as dying of “suspected damage to the fetus from other diseases in mother” and coded by the state as dying of “venous complications in pregnancy and the puerperium.”

These cases illustrate the difficulty in accurately identifying maternal deaths. Some states have fields on their death certificates to specify a recent pregnancy so that live birth and fetal death records can be matched with deaths to women of reproductive age to help identify possible pregnancy-related deaths. Medical records can then be reviewed to determine which were pregnancy-associated (time only) and which were truly related to the pregnancy. We recommend adding this field to death certificates.

The FIMR Project compared the number of reported maternal deaths to the number of deaths to women of reproductive age from all causes from 1994-1996. There were 5,206 deaths to Los Angeles County women 15-44 years of age and 63 pregnancy-related deaths from 1994-96 (1.2% of deaths to women of that age group).

Technical Review Panel Process

The FIMR public health nurse prepared a case summary of each maternal death. Information was abstracted from death certificates, coroner's records, and medical records. Data from birth or fetal death certificates and/or infant death certificates was also abstracted. No identifiers of the patients, facilities, or health providers were included in the summaries. On average, four case summaries were reviewed each month by a multidisciplinary Technical Review Panel to determine:

- cause of death;
- contributing factors;
- chance to alter the outcome; and
- recommendations for systems change.

Recommendations to help prevent similar deaths in the future were developed from the case reviews. See Appendix 1 for the form used by the panel to review these cases.

An Epi-Info database was developed with the assistance of Elizabeth Adams, a CDC epidemiologist. Data were coded by FIMR project director and public health nurse. The abstracted data, the Technical Review Panel's findings and recommendations were entered into the database. A subset of the data was cross-coded by epidemiologists at the California DHS to ensure accuracy and consistency.

Data Limitations

The completeness of the reporting of maternal deaths is uncertain. Medical records were of varying accuracy and completeness but often were of poor quality, largely illegible and sometimes contradictory. Vital records were also of varying quality and not consistently coded as to cause of death.

The panel members were aware that the task of examining maternal deaths retrospectively, with the advantage of hindsight, is not the same task as managing the care of a pregnant woman in real time. It is not the intent of the panel or the FIMR Project to assign blame for these deaths but to identify systems gaps that are amenable to action.

Autopsies were performed by either the hospital or the coroner in nearly four fifths of the maternal deaths. Valuable additional information was added to the review process from the autopsy reports. In the remaining fifth, it was sometimes difficult to accurately determine the causes and contributing factors.

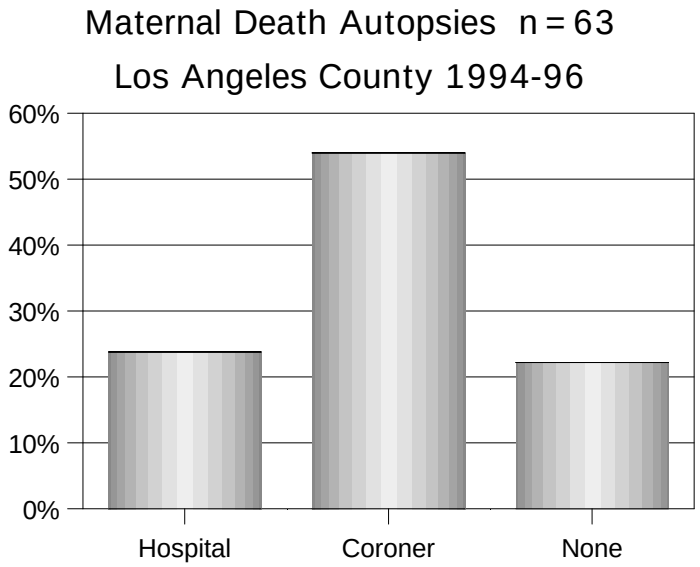

Figure 1 (see Table 1 in Appendix 4)

Three years of maternal deaths were combined in order to see patterns in the data, but with a total sample of only 63 deaths it is still difficult to achieve statistical significance. The information is this report should be considered anecdotal. Since maternal mortality is such a rare event, it is impossible to identify statistically significant findings even in a large urban area over several years. The cases can be treated as paradigms, or sentinels of similar events. H.L.Mencken said, “For every problem there is a solution that is simple, neat and wrong.” There is no simple solution to the problem of maternal mortality. It is fortunately a rare event in developed countries and its causes and contributing factors are diverse.